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DS3000 - Foundations of Data Science
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HW2 - Crime, Cannabis, and Connectivity

Introduction:

Over the last seven years, our world has changed dramatically due to the effects of the Covid-19 global pandemic. Due to the many changes to the rules and norms of our society in that time and the subsequent alterations to our day-to-day lives, it stands to reason that behavioral extremes - namely, crime and illegal activity - would change alongside their mellower counterparts. This paper will explore various facets of the problem, such as how violent crime has changed over the course of the early 2020s, how the socioeconomic status of various neighborhoods affected the changes that accompanied the pandemic, and whether or not the trends created by the pandemic have outlasted the disease.

Methods:

I started with an SQL-focused approach and a series of simple queries to get a general sense for trends in the data. I then created geographical visualizations using Seaborn and Matplotlib in the form of scatterplots, hexbins, and heatmaps, as well as some basic bar graphs to formalize my findings in the SQL database. Afterwards, in order to hone in on my research questions, I moved to more specific methods of approaching the interaction between Covid-19 and crime geographically and chronologically with more heatmaps and a series of bar graphs, using subsections of the data (violence, time/date, location, etc) to create more specific graphs. I also used data from the Boston Planning and Development Agency and articles from the Boston Globe to give context to my visualizations. The graphics that appear in this paper are by no means a comprehensive display of my analysis, and for the sake of brevity I will be referencing plots that appear in my notebooks instead of in the paper.

Analysis:

General - Even at a glance, from these initial graphs (Figure 1) it's clear that there was a significant decrease in crime from 2018-2020 (from 98,888 incidents to 70, 894)[1,2], and a subtler increase from 2020-2022 (up to 73,852)[3].

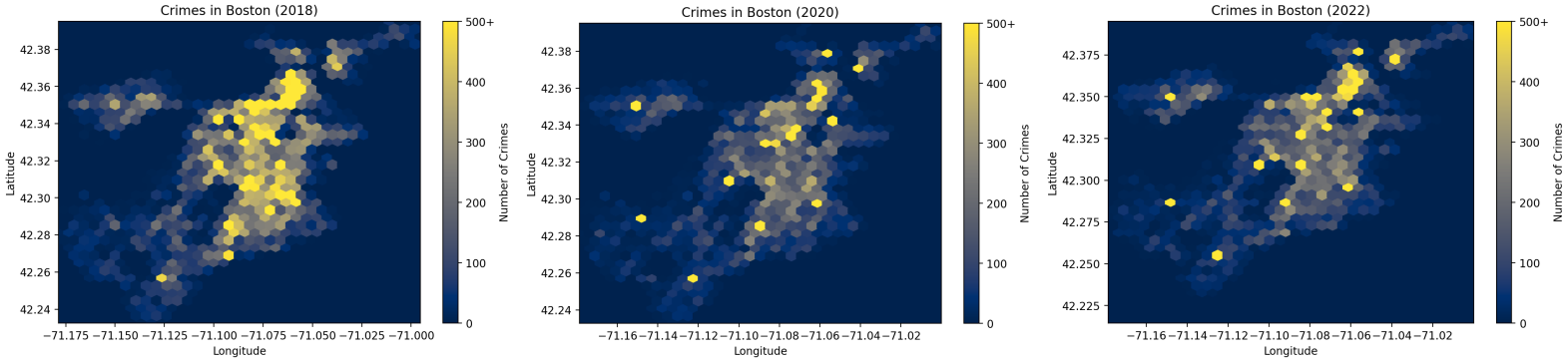


Fig. 1: General trend hexplots (from 2018, 2020, 2022). Higher density of crime in yellow.

However, while visually interesting, these graphs don't tell us much in terms of specifics. An important question when it comes to trends is always how different classes may be impacted by current events.

District Trends - Figure 2 attempts to shed some light onto the subject:

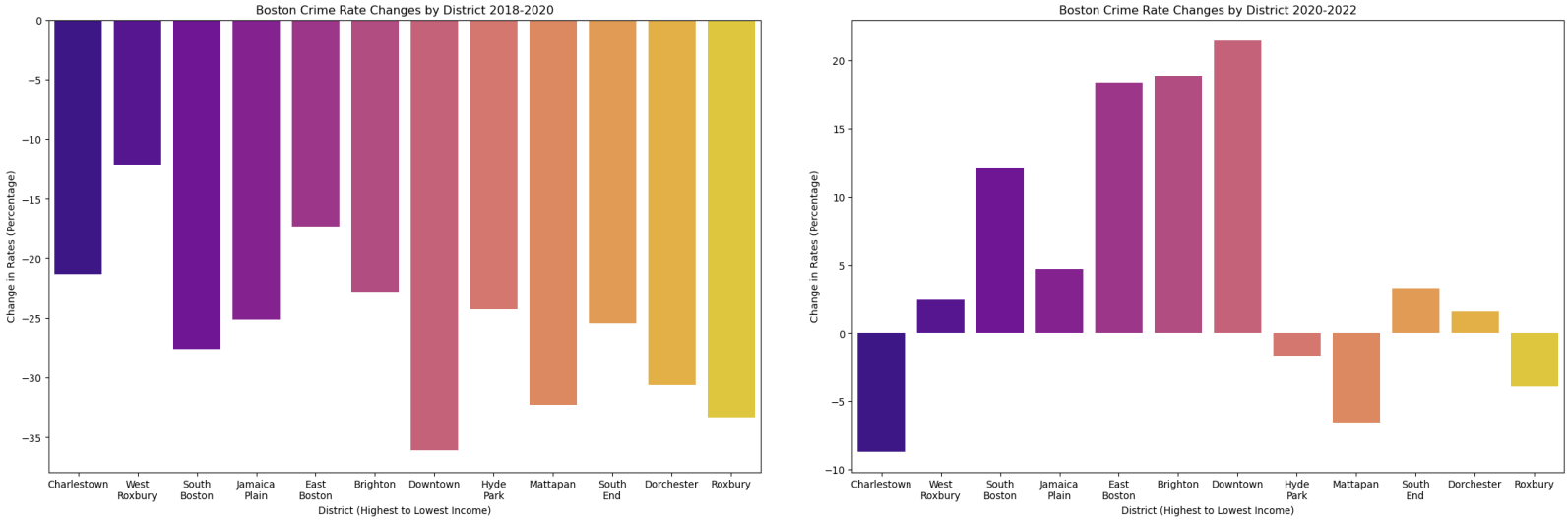


Fig. 2.1 and 2.2: Percentage changes in crime rates across districts, '18-'20 and '20-'22. Low-high income.

These graphs, alongside cells 9, 10, and 11 in the 'district_comparisons' notebook, show us how districts differed in their crime rate's reactions to the pandemic. As a general rule, as the median income of a district decreases, the greater the drop in crime. As the pandemic began to wrap up, crime rates went back up in populous residential and commercial districts. Crime rates continued to fall in both the lowest and highest-income districts after the pandemic had ended.

Violent Crime - Our last question has to do with violent crimes, shown in Figure 3:

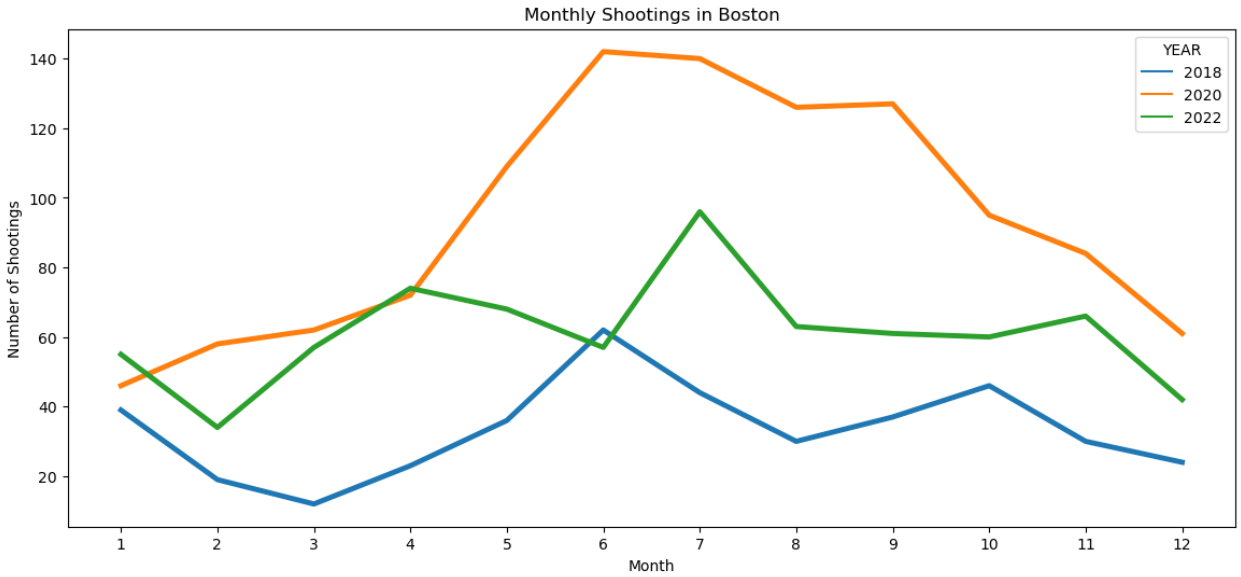


Fig. 3: Chart of monthly shooting trends in Boston 2018-2020-2022.

While one might expect violent crimes to reduce during a lockdown, it would appear that there was an increase. An excerpt from the Boston Globe helps provide some insight on the subject:

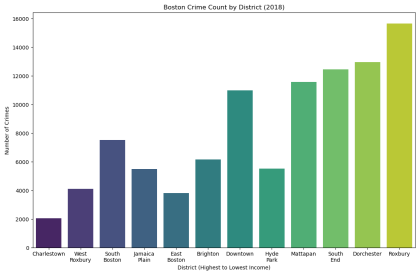
"Violence peaked during the summer and fall, coinciding with massive protests over the police killing of George Floyd in Minneapolis, but "the connection, if any, between the social unrest and heightened violence remains uncertain," the think tank's report said.

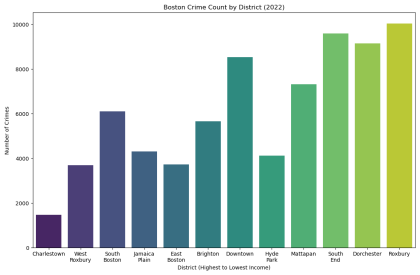
Connections between the COVID-19 pandemic and the uptick in violence are more concrete, according to the report. Social distancing has made it difficult for police to prevent and investigate crimes and also hampered anti-violence efforts by street outreach workers."[4]

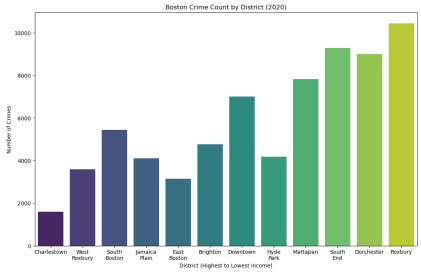
Conclusions:

Both of my primary questions going into this assignment provided interesting results. When it comes to Covid-19's overall effect, the halting of city activity for the greater part of two years clearly reduced the overall crime rates for at least a couple of years.

Across the districts, while there were some variations in the trends seen, these three graphs (crime numbers across districts in 2018, 2020, and 2022) remain difficult to separate at a glance.







Covid-19 did *not* cause an increase in the ratios of crime various neighborhoods experienced, and while the numbers themselves are different, the patterns of crime in the city remain largely unchanged.

When it comes to violent events, far past reducing the number of shootings, Covid-19 seems to have *increased* their frequency. This may be attributed to the accumulation of pent-up violent energy, or potentially the lack of activity from the Boston police during the lockdown, or simply some other unknown factor such as the availability of firearms or the political events of the nation.

In conclusion, the pandemic reduced Boston's crime rates and did not cause additional criminal inequality between the social classes of the city, but resulted in a seemingly lasting increase in gun violence. As of today, the lower crime rates seem to be maintaining, and it may well be the case that Covid-19 has a long-term reducing effect on crime in Boston.

References:

1. Tables used for analysis and visualizations. data.boston.gov
2. "Homicides and shootings are on the rise nationwide. Boston is no different." Boston Globe, January 3, 2021. https://www.bostonglobe.com/2021/01/03/metro/homicides-shootings-are-rise-nationwide-boston-is-no-different/
3. Boston Development and Planning Agency. https://www.bostonplans.org/
4. ChatGPT. https://chat.openai.com/ Used for brainstorming topics and quick questions. All answers were vetted, and no code from ChatGPT is used in final visualizations.